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American Innovation: Preserving and Providing Access to 80 Years of Industrial Design History

Art Center College of Design

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ABSTRACT

From washing machines to computers, from sports cars to space capsules, America's infatuation with invention has fueled industrial design. Design history helps us understand American culture in a whole new way. This white paper analyzes the archival pilot project "American Innovation: Preserving and Providing Access to 80 Years of Industrial Design History." The goal of the project was to increase awareness of industrial design innovation in Southern California through digital preservation and access to the historical archives of Art Center College of Design. The essay is written with two audiences in mind: **1)** archivists seeking to better manage digital collections, and **2)** researchers interested in the history of industrial design in Southern California. The project was supported by a Humanities Collections and Reference Resources Foundations grant through the National Endowment for Humanities.

Biographies

Robert Dirig manages the Art Center College of Design Archives including acquiring, appraising, arranging, preserving, describing, and providing access to archival material relating to the history of Art Center. He has an MLIS from UCLA and is a member of the Society of American Archivists, Society of California Archivists, and the Association of Moving Image Archivists. Dirig worked at the UCLA Film and Television Archives and the Japanese American National Museum. He has facilitated successful grants from the National Film Preservation Foundation and the National Historical Publications and Records Commission.

Dr. Amy Shimshon-Santo is a researcher, educator, policy advocate and fundraiser who is inspired by how new technologies can enhance teaching and learning, and expand public participation. She serves as the Assistant Director of Foundation and Government Relations for Art Center College of Design. Shimshon-Santo is the former director of ArtsBridge at UCLA's School of the Arts and Architecture. Her research has been published and distributed by UC Press and SUNY Press, among others. She holds a Ph.D. in urban planning from the UCLA Luskin School of Public Affairs.

Any views, findings, conclusions, or recommendations expressed in this essay, do not necessarily represent those of the National Endowment for the Humanities.

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INTRODUCTION

From washing machines to computers, and sports cars to space capsules, America's infatuation with invention has fueled industrial design. Design history helps us understand American culture in a whole new way. Each mundane or fantastical object, invented by designers, reflects American culture within a specific time and place. These inventions give material form to a generation's identity, values, and yearning for what is possible.

Art Center College of Design is widely recognized as one of America's leading school of industrial design. It has been at the forefront of the field since its founding in 1930 by Edward A. "Tink" Adams and his inspired colleagues. The College emerged during the Great Depression and provided new educational and professional pathways at a time when the country hungered for a brighter post-Depression reality.

Art Center College of Design's learning community of avid futurists and aspiring problem solvers understands that the past is a critical benchmark for future progress. We also believe that the arts and design are powerful tools to create and understand the world as it was, is, and will be.

Design innovations in industry and manufacturing have impacted the lives of countless individuals, households, and communities. Art Center's archives are a valuable resource to the study of American popular culture, product and transportation design, urban planning, industrial development, aesthetics, modernization, and sustainability. The archives house rich collections of over 100,000 photographs, 2,000 films and videos, and 500 linear feet of print materials documenting influential figures in American design history as well as the complete research and design process.

The pilot project, "American Innovation: Preserving and Providing Access to 80 Years of Industrial Design History," focused specifically on one-of-a-kind elements at risk for deterioration in Art Center's industrial design collection. We are grateful to the support of the Humanities Collections and Reference Resources program of the National Endowment for the Humanities.

This essay is aimed at two distinct audiences: **1)** archivists who grapple with how to best bring their historical collections into the digital age, and **2)** researchers, educators, and practitioners who are passionate about industrial design history and innovation in Southern California.

Key Questions

Our project vision began with two basic questions:

- How can Art Center's archives increase access to researchers interested in the history of industrial design in Southern California?
- How can archives best preserve and make digital collections accessible for researchers in the digital age?

These key questions focused the project team during the complex implementation phase. Once we got started, these questions generated other questions such as: What kinds of expertise, policies, and procedures are required to implement digital archives? What are best practices to institute a digital management system with a traditional analogue collection? What kinds of space—both physical and virtual—did our archives need for the collections? How could a private institution create public access to collections if they are housed on a private server? How could we best promote the digital and analogue archive to researchers interested in industrial design? How can we make the collection most useful to users?

The diversity of knowledge required to answer our questions lent itself to a collaborative, interdisciplinary approach to problem solving. This reality influenced the design and implementation of the American Innovation project.

The achievements during this project are not purely technological in nature. Digitization required new ways of working together with people across disciplines from library sciences to IT, and from faculty to peer institutions. As a result, the pilot process suggests new roles for archives as hubs for historical knowledge, trans-disciplinary problem solving, and innovation in higher education.

Background

Art Center's collections of historical materials and ephemera started when the college was founded in 1930. From 1930 to 2003, the collections consisted mainly of photographs and printed materials that were housed in the Library, but were not cataloged or accessible to the public in a structured way.

The Art Center College of Design College Archives was established in 2003 with assistance from the Getty Foundation. At the time, the college had become aware that its historical collections were a valuable repository for the history of arts and design innovation in Southern California and, oftentimes, included projects of global relevance.

Catalytic investment in the Art Center Archives came from the Getty Foundation in preparation for its momentous regional initiative *Pacific Standard Time*. This regional collaboration between artists and arts organizations celebrated the region's eclectic cultural identity and history. Support from the Getty Foundation allowed the college to process and catalog much of the photography collection and establish policies and procedures for managing the collections.

Later, curators from the Los Angeles County Museum of Art (LACMA) turned to Art Center's archives for elements of their exhibition, *California Design, 1930–1965: Living in a Modern Way*. Their research highlighted a number of former Art Center industrial design faculty members, including Strother MacMinn, Kem Weber, and Charles Kratka. Art Center was able to assist with their research, lend the 1937 Art Center catalog for the exhibition, and license images for their publication, *A Handbook of California Design, 1930–1965: Craftspeople, Designers, Manufacturers*.

During the archives first several years, time was spent arranging and describing the analog collections that had been in an unprocessed state for decades. However, when the digital collections began growing, we saw the need for tools and policies to better manage both analogue and digital collections. Over time, the archives noticed a significant increase in research requests and demand for the collections. However, we had no means to share the digital collections with the broader public.

The demand for better preservation and increased access are interrelated. The mission of the archives needed to go beyond merely scanning analogue resources. We needed to find useful ways to both manage and make the resources accessible to researchers.

For over twenty years, digital records have been coming into archival repositories. Long-term preservation of digital records has been a topic of archival research and practice since the mid-1990s. The field of information sciences has continued to debate about how to best preserve digital content and make it available for research. Digital management software has become available to enable institutions to share and manage collections online.

In 2011, the Society of American Archivists (SAA) began its Digital Archives Specialist (DAS) Curriculum and Certificate Program, which included courses on aspects of managing digital records. These workshops signaled an important step in the field and created a platform for sharing standards and best practices for managing digital archives.

The Art Center Archives project followed the standards for the Open Archival Information System reference model (OAIS, ISO 14721:2003) as a framework for long-term preservation and access of digital records. The OAIS model takes the core archival

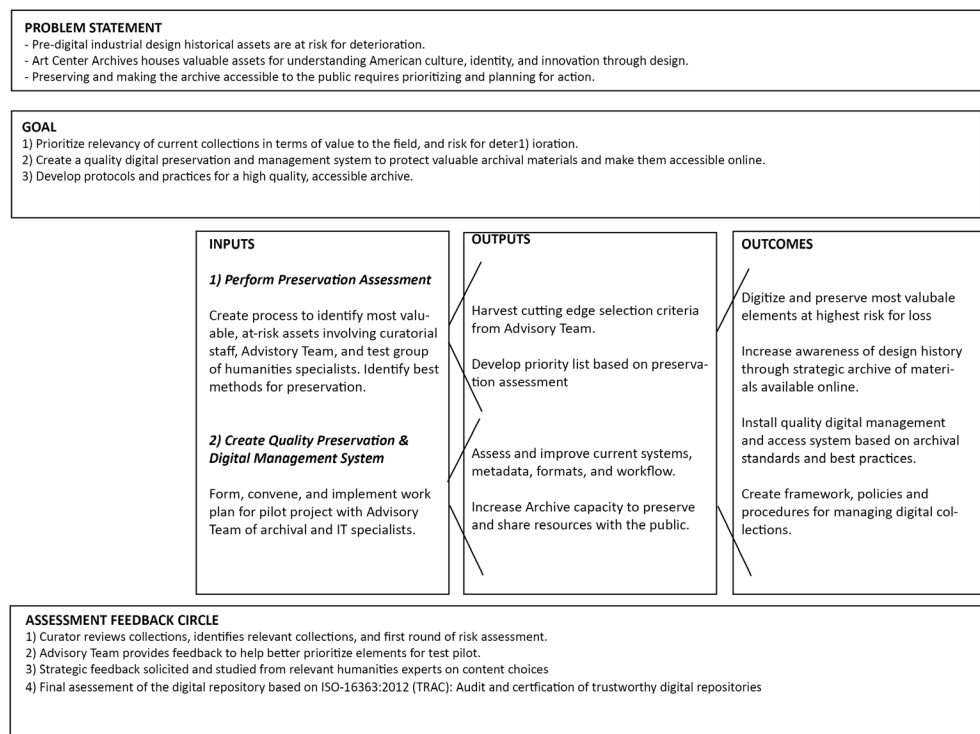
workflow (beginning after appraisal), and translates it into the digital realm, beginning with the Submission Information Package (SIP), onto the Archival Information Package (AIP), and, finally, the Dissemination Information Package (DIP). The workflow includes preservation steps for storage planning, metadata input, and data management.

Our archives works at the crossroads of both old and new. It preserves and provides access to analogue and digital materials that can illuminate the history of the arts and design.

Logic Model

The American Innovation pilot project was guided by a logic model that pinpointed core problems, projected goals, interventions, outputs, outcomes, and a constant assessment feedback process in order to achieve our aims.

Figure 1: American Innovation Project Logic Model.



The problem we wanted to solve was clear: Art Center College of Design's Archives houses valuable assets for understanding American culture, identity, and innovation through design. However, elements of the Art Center's industrial design collections were at risk of deterioration and loss. Preserving and making the archive accessible to the public required prioritizing and planning for action.

Our tangible goals were to: **1)** Prioritize relevancy of current collections in terms of value to the field, and risk for deterioration; **2)** Create a quality digital preservation and management system to protect valuable archival materials and make them accessible online, and **3)** Develop protocols and practices for a high quality, accessible archive.

We emphasized two areas of action or intervention: **1)** Prioritize and curate a pilot sample for digitization, and **2)** Develop a preservation and digital management system.

Prioritization

The level of need was great and required thoughtful prioritization and curation of the sample for digitization. We created a collaborative process to identify the most valuable, at-risk assets by involving curatorial staff, a project advisory team, and a test group of humanities specialists.

We projected that the initial impact of prioritization and curation would be developing selection criteria from the advisory team and creating a preservation hierarchy based on the assessment criteria.

We expected that longer term impact of the prioritization would be to successfully digitize and preserve the most valuable elements at highest risk for loss, and to increase awareness of design history through strategic archive of materials available online.

Digital Management

Our second area of intervention was to create a quality preservation and digital management system. Our archival staff engaged the advisory team, and campus Information Technology (IT) specialists, to structure, convene, and implement a work plan for the project.

We believed that the short term outputs of digital management would be to assess and improve current systems, metadata, formats, and workflow. We also hoped that this would increase the archives capacity to preserve and share resources with the public.

We hoped that the longer term outcomes of improving digital management protocols would be to install and assess a quality digital management and access system based on archival standards and best practices. A policy and procedural framework would be developed to manage the digital collections.

Assessment

We envisioned assessment as a constant feedback circle throughout the entire process. First, we would collect feedback through curatorial reviews of the collections from designers, educators, historians, researchers, and librarians to focus on relevant material culture. The curation process would include a sound materials risk assessment. We would engage the advisory team and IT staff as sources for constant constructive critique and professional feedback to help implement a successful pilot project.

OVERVIEW OF CASE STUDY

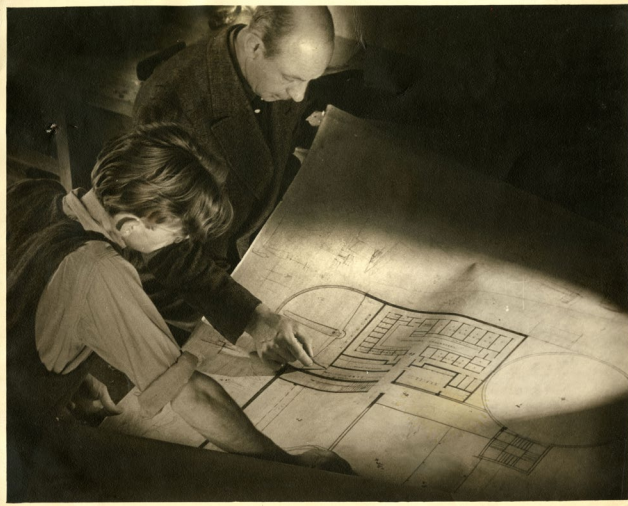
This case study is divided into two sections: Significance and Process. The significance section is geared towards researchers who want to understand the scope and relevancy of Art Center's industrial design collections from 1930 to 1960. It also provides a glimpse into selections digitized during this process. The process discussion is geared towards archivists and librarians interested in digital management. This section provides detailed reflections on forming the interdisciplinary team, collaborating across areas of expertise, selecting and digitizing assets, installing and testing a digital management system, protocols and procedures for preservation and access.

SIGNIFICANCE

Historical Context

The Art Center College of Design Archives collections are significant in that they elucidate the response of industrial designers to the Great Depression, World War II and the post-war period. When Art Center was founded in 1930 by Edward A. "Tink" Adams, and a small group of colleagues, the first areas of study were advertising, illustration, and painting. Within two years, the modernist industrial designer Kem Weber had founded an Industrial Design Department. There are records substantiating Weber's presence at Art Center from 1932 to Spring 1943.

While Weber is well known for his work in furniture design, esteemed historians of industrial design were yet unaware of his role as a teacher and mentor. During the project, Christopher Long approached the archives for information while developing his book *Kem Weber: Designer and Architect*. Mr. Long had discovered a letter from Weber stating that he was leaving Art Center in 1943 and wanted to learn more. The archives was able to provide Long access to historical documents illuminating this aspect of Weber's life, and licensed imagery to him for use in his forthcoming publication for Yale University Press which is scheduled for release in November 2014.



Kem Weber (right) with a student regarding the architectural plans for a class project to design a new Art Center campus. Photography by Irene Vermeers. Gift of Irene Vermeers (PHOT 1937) (2003.1.16)

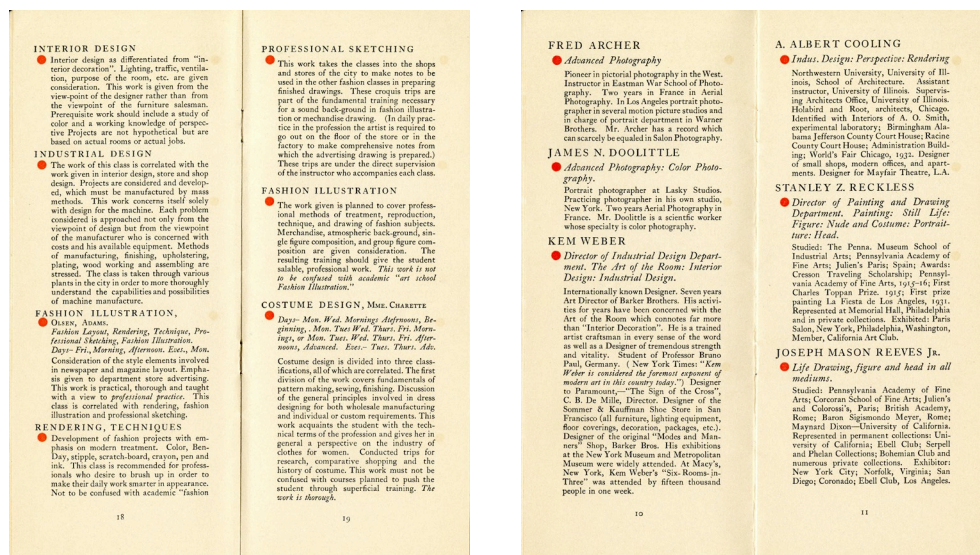
Historians of industrial design history in the United States trace its emergence to the early 1930s. However, Southern California's history has been largely missing from this national story. The esteemed design historian and author Carrol Gantz wrote,

In writing my book *Founders of American Industrial Design*, I found very helpful information about Kem Weber, one of the founders, from correspondence exchanges with Robert Dirig and Katherine Bennett at the Art Center College of Design. Their information clarified Weber's role in design education, and could help scholars and experts in design history to better document the special role of Southern California in design history.

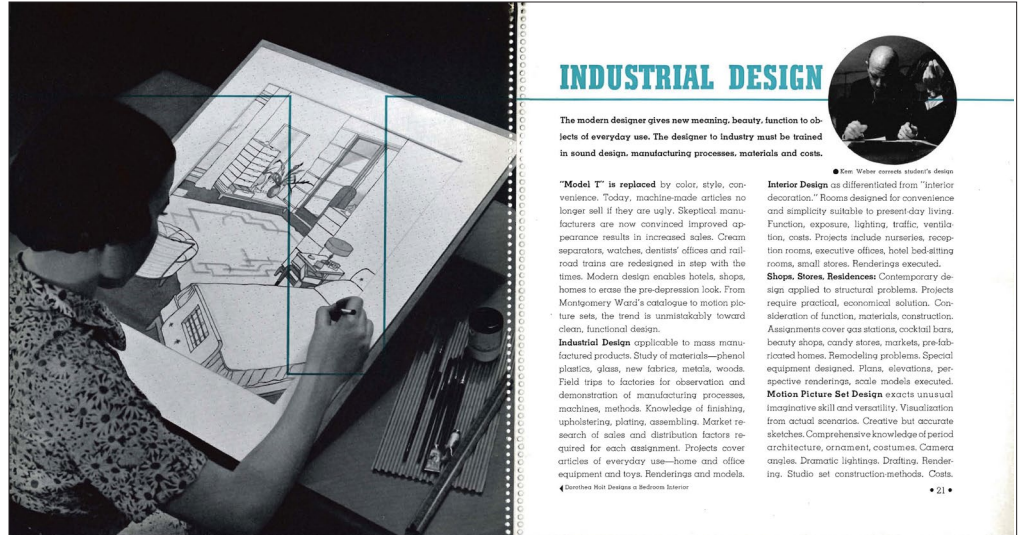
The American Innovation project unearthed a program from 1931–32 that reveals that industrial design education was being developed at Art Center simultaneously with the very first design education innovators in the United States. This finding deserves more attention in future research, and, at the very least, suggests untold pioneering roles for design and design education in Southern California.

The ability to tell the history of industrial design in a more comprehensive way depends in part on access to primary source materials on the origins of industrial design in the Southwest. Katherine Bennett (Historian and Associate Professor at Art Center College of Design) explains, "What's true today is just as true of yesteryear. The rest of the country doesn't know what's going on here [in California], or went on in the 1930s, because we've been too busy to tell the story."

Industrial design classes and director Kem Weber from *The Art Center School Schedules*, 1932



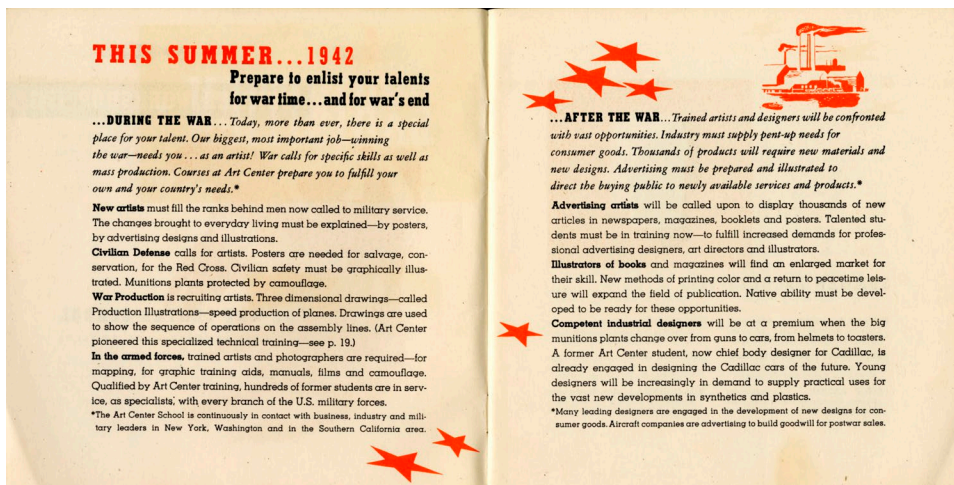
1937 Art Center School catalog



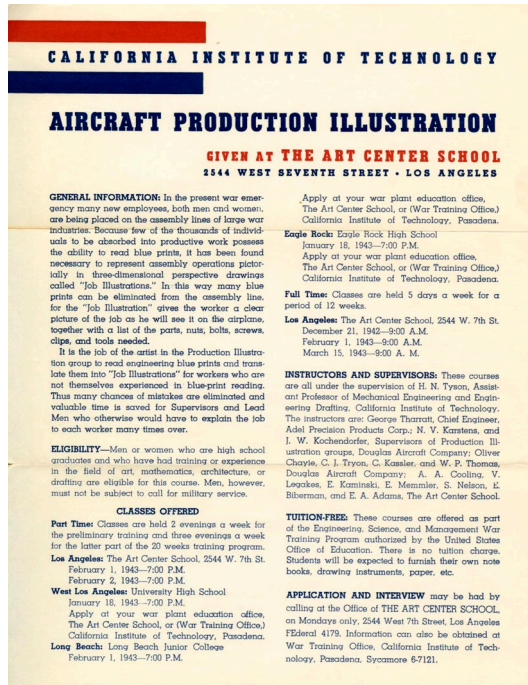
For decades, Industrial Design education at Art Center encompassed Product Design, Transportation Design, and Environmental Design. However, Bachelors and Masters degrees in the Professional Arts began to be awarded at Art Center in 1949.

During World War II, Art Center ceased normal operations and was authorized by the War Department Engineering and Training Division to offer mainly production illustration courses in conjunction with the California Institute of Technology. These courses taught students to translate blueprints into three dimensional perspective job illustrations so that assembly line workers with little experience in blueprint reading could more effectively do the job. In a 1942 Art Center catalog, emphasis was already placed on the need for designers after the war. A flier from the archive states that, "Competent industrial designers will be at a premium when the big munitions plants change over from guns to cars, from helmets to toasters."

Summer Workshop 1942, The Art Center School



The bulk of the industrial design photograph collections begin post-war in the late 1940s. After the war, enrollment increased to over 700 students—mostly due to college support for students from the G.I. Bill. By 1947, Art Center was operating in a new larger campus on Third Street in Los Angeles. For transportation design, 1948



Brochure for Aircraft Production Illustration courses, 1943

was a significant year at Art Center. Three designers from General Motors Styling Section Strother MacMinn, George Jergenson, and John Coleman established the transportation design major and Art Center's connection to that industry.

Art Center's fascinating partnership with post-war Japan began in the mid-1950s. In 1956 a small team from Art Center visited Japan as guests of the Japanese Government to give seminars and lectures and open up a discussion on industrial design. Representatives from Art Center included President Edward A. Adams, faculty members George Jergenson and John Coleman, and a graduate Frank Nakamura, who also served as the interpreter. There were tours and receptions, and the creation of lasting relationships between designers who remembered it fondly. The result of the very successful trip was a bilingual report written by Art Center titled *The Future of Japanese Industrial Design*, related to export and domestic uses.

That same year, through sponsorship from the Japanese External Trade Recovery Organization (JETRO), Japanese exchange students came to Art Center to study industrial design. One of those students was Kenji Ekuan who went on to become Chairman of GK Design Group in Tokyo. Images in the collection capture early examples of the global interchanges that have become a core element of Art Center teaching and learning, and informed international connections and innovations in industry.

The American Innovation project affirmed that the Archives of the Art Center College of Design is a significant historical repository that can help better understand industry, innovation, and design during the Great Depression, World War II and post-War periods.

Digital Snapshot

No discussion of the American Innovation project would be complete without including elements of the historical assets that were selected, digitized, and brought into the new digital management system for access to researchers. This section overviews the foci for digitization and shares select imagery with descriptions from the digitized industrial design collection.

The advisory team focused its digitization efforts on the earliest photographs in the collection, 1930–1960 (bulk 1948–1960) were the most significant and most at-risk for deterioration. Within that collection, faculty believed that images showing early indus-

trial design teaching methods and learning processes are important to understanding how industrial design was taught. For that reason, we included process oriented classroom documentation in addition to early images of student work.

Selections from early sponsored projects were chosen as the secondary priority. Sponsored projects focus teaching and learning on real world design challenges from the field. Since 1960, Art Center has offered classes that spark new ideas and approaches to industry. These courses were sponsored by industry leaders and directly fueled real world problem solving and innovation in the field.

Transportation Design team members and archivists agreed that projects showing holistic representations of the transportation design process from beginning to end would be a priority. Two projects in particular were selected for digitization: The Catalina Project (1960) and the Los Angeles Transystem project (1970).

Boat design images were selected from the Catalina Project (1961) which was prepared for members of the Industrial Design Society of America and shown at a national convention on Catalina Island. Students designed, built, and demonstrated five motorized water vehicles. This well-documented project captured the design process and product outcomes.

Los Angeles Transystem project (1970) allowed students to design a futuristic Los Angeles public transportation system aimed for the year 1990.

The John Coleman collection of images, from a notable international exchange trip to Japan in 1956, was also selected for digitization. During this trip, Art Center representatives met with industry leaders in Japan and reported on the state of Industrial Design. These images capture early examples of the global exchange that has become central to Art Center teaching and learning, and informed international connections in industry.

In addition to images, six films were selected for preservation that illustrate the processes and outcomes of the industrial design department. Five are from the Franklin Judson collection that show industrial designer Kem Weber working with student on projects from the late 1930s. A second film in the collection features instructor Strother MacMinn working with a student on a sewing machine project from 1951. Unfortunately, we were unable to preserve and digitize one film from the Judson collection as we had hoped due to severe deterioration.

Strother MacMinn and unidentified students at work on product drawings in the classroom, circa 1949. (2004.22.22)



Joseph Thompson advising A.K. Ragheb (PROD 1951) on building the framework for a boat design assignment, circa 1949. (2004.22.31)



Strother MacMinn and an unidentified student discussing a sewing machine model, circa 1951. (2004.22.152)



A student working on a three-dimensional space model, circa 1949. (2004.20.610)



Joseph Thompson viewing a wooden framework model of a car in the process of being worked on by students, circa 1949. (2004.23.45)



Student, Dorothy Krapf, working on constructing a chair, circa 1949. (2004.20.606)



Students at work on a clay model of a car with George Jergenson observing, 1949. (2004.23.70)



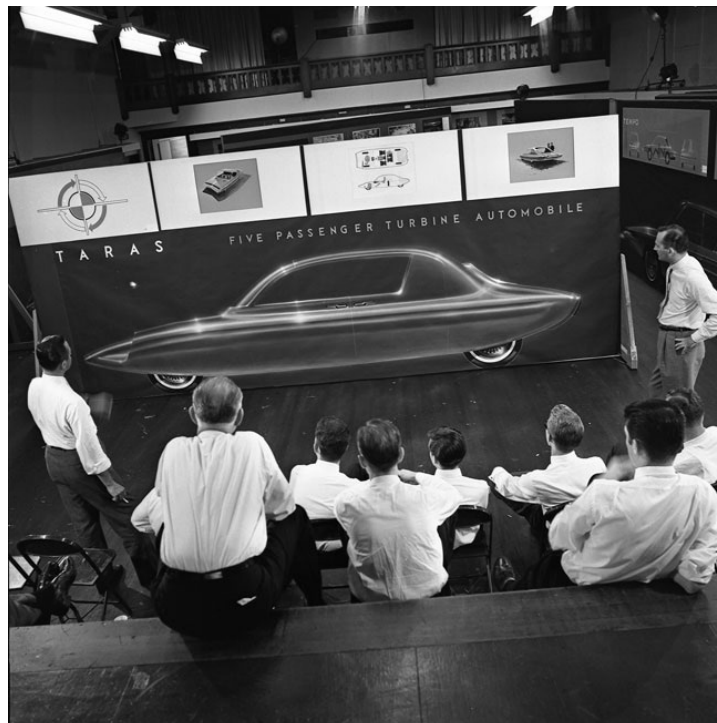
John Coleman and unidentified students with finished product models, 1959. (2004.22.280.1)



Instructor John Coleman advising students as they work on the wooden framework for the General Electric Space Capsule Project, 1960. (2004.22.2202.E)



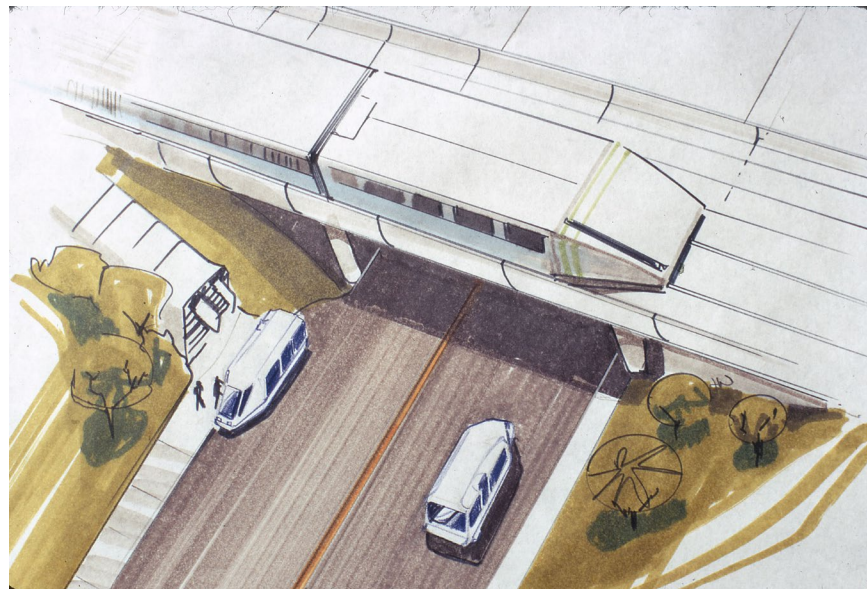
General Motors Turbine Car project, 1960. (2004.23.3233.A)



Ford Argonaut project, 1965.
(2004.23.2472)



General Motors Irvine Project,
1971-1972. (2004.23.3715)



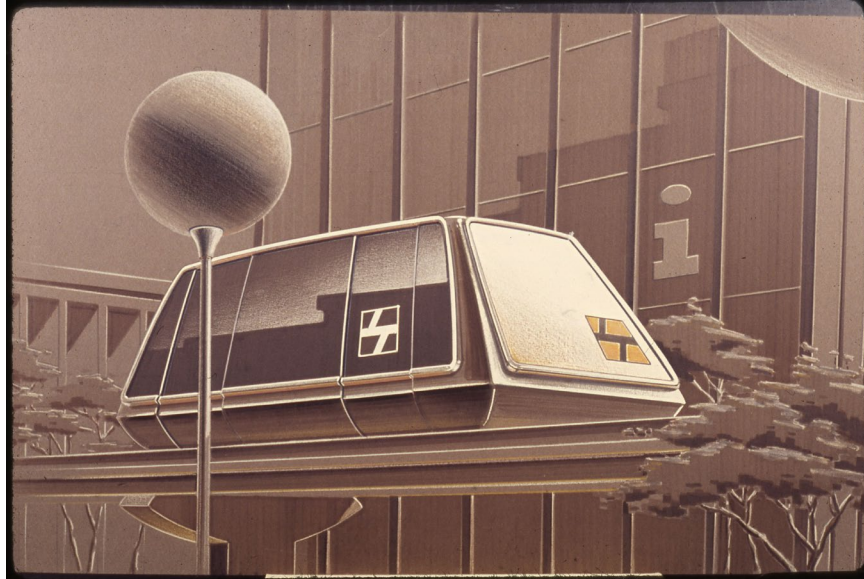
Catalina Project, 1961
(2004.22.2487)



Catalina Project, 1961.
(2004.22.2832)



Los Angeles Transystem, 1970.
(2004.23.1287)



Los Angeles Transystem, 1970.
(2004.23.1300)



Art Center's 1956 trip to Japan to report on the state of industrial design. Art Center representatives George Coleman and Frank Nakamura showing drawings to a group of students. (2004.83.85.3)



PROCESS

Facilitating Collaboration

The planning process relied on leadership from the archives staff to facilitate collaborative leadership. The breadth of the project would never have been possible to achieve by the library alone.

During the initial project planning phase, the archives formed an advisory team of faculty, staff, and outside experts who were invited to help guide the complex process of selection, digitization, sustainability planning, and dissemination. Ultimately, it is the archives' responsibility to meet the project goals within the time frame, budget, and staff allocated.

Mobilizing interdisciplinary collaborators was critical to the project success and we expect these relationships to be useful to the archives in the years ahead.

Faculty Engagement

The archivists met with faculty and department chairs (Karen Hofmann, Product Design Department; Andy Ogden, Industrial Design Department; Stewart Reed, Transportation Design Department; Shouzhi Wang, Humanities and Design Sciences Department; and Katherine Bennett, Humanities and Design Sciences) to study the collections and determine the aspects of greatest significance to scholars.

Inclusion allowed faculty to play an active role in the archives and better understand its purpose and value for teaching and research. The faculty and departmental chairs had been somewhat familiar with the archival collections, but their awareness of the archives value increased as a result of this project. Their support and motivation also grew as the pilot focused on the histories of work produced in their different disciplines.

Faculty also connected the archives with design historians. For example, Katherine Bennett shared with us historical writings on early industrial design education, and connected us with Carroll Gantz, a prominent industrial design scholar. We corresponded with Gantz by email throughout the project, and discussed early 1930s industrial design education. This allowed us to compare our history with the evolution of industrial design in other regions.

External Experts

The advisory team also included leading experts from professional organizations outside Art Center. They included: Dan Lewis (Chief Curator of Manuscripts, Huntington Library in Southern California); Leslie Mark Kendall (Curator, Petersen Automotive Museum); and Susan and Johan Severtson (Co-Executive Directors, Design Information Alliance). This expanded community of expertise joined us in discussing the pilot project, assessing the software before and after implementation, scanning procedures, and strategies for how to best serve potential users.

Inter-Departmental Collaboration

Proper collaboration with IT professionals is critical to any successful digital archives project. In addition, archives staff must familiarize themselves with IT systems, protocols, and policies, and be able to work successfully with IT staff to define a common language and mutual goals.

In this case, archives staff worked closely with IT staff in two areas: Application Services and Network Services. The IT department serves the entire campus and its small staff is highly sought after. The archives needed to be persistent and understanding of the other claims on their time. Having the tangible NEH grant support and deadlines helped the archives advocate for attention to move the project forward in a timely manner.

Collaboration with IT staff and consultants was necessary to implement the software and calculate the long-term storage and access needs of the archives. As a result, the pilot process was educational for both IT and the archivists. Maintaining network storage, installing software and managing the application was much more complex than

we originally anticipated. For example, Archivemata and AtoM required a great deal of technical knowledge to install that went far beyond the skillset of the archivists.

Additional collaborators included the Development and Marketing/Communications offices in the college. The Archives staff worked closely with the Foundation and Government Relations staff throughout the project. Archival grants can enable groups to take positive risks and institute new processes. Since its inception, development has always played a transformative role for the archives. It is advisable for archives to view relationships with fundraisers and marketing as collaborations instead of support staff—especially given their wide knowledge of the institution and field.

Consultancies

Software consultancies were yet another core aspect of successful collaboration. The Archives worked with Artefactual Systems, the developers of Archivemata and AtoM, as consultants to assist with installation, training, maintenance, and long-distance support. The staff at Artefactual consists of archivists and IT specialists, which was appealing to us as we researched software. It was beneficial that the consultants could work closely with both our archives and IT staff since they often served as a bridge between the two departments and fortified a common language between us. They assisted with installation and maintenance, but, also, with broader solutions to establish a digital preservation and access program.

Digital Preservation and Collection Management

The pilot project allowed the archives to research cutting edge practices and systems for digital preservation, access, and collection management through testing Archivemata and AtoM. We tested specific software and analyzed the policy and procedural implications for systemic change.

Prior to this pilot project, the archives would digitize items on a case-by-case basis in response to individual requests. We had never had the opportunity to select or curate materials in advance in relation to research importance or the risk of deterioration.

After the collaborative selection process with faculty, digitization followed the highest standards. All of the images were digitized in-house using an Epson Expression 10000XL scanner. TIF images were created following best practices for resolutions, and JPEG copies were created for access. Art Center publications were scanned in-house and PDF files were created through Adobe Photoshop and Acrobat. The films were preserved and digitized by Deluxe Media Services, LLC., and high resolution DPX files were created as well as an HD-CAM tape. A lower resolution digital file was created for access.

Software Implementation

Prior to this project, the archives had been using Past Perfect software to manage and catalog collections. Over time, the need arose for diverse functionality including web-based access and digital preservation. Working with IT prior to the pilot project, archivists began researching alternative software solutions including DSpace and Luna Insight. The latter is used for the College's Library digital image collection. While both pieces of software had advantages, neither of them conformed to the needs of both archives and IT. We wanted to use a system that would permit the important element of digital preservation.

The archives began researching Archivematica and AtoM (Access to Memory), an open-source software developed by Artefactual Systems, Inc. that is designed to handle digital preservation and collection management. Archivematica is an application that processes files through a group of micro-services which align with the OAIS. It is completely standards-based, using Metadata Encoding Transmission Standard (METS) and Preservation Metadata Implementation Strategies (PREMIS), along with other descriptive metadata standards.

Archivematica was only half of the puzzle to piece together a complete digital workflow. We also had to address collection management and access. AtoM is software bundled with Archivematica that is a standards-based web archival description and access tool. Together with Art Center's IT department, the college archivist reviewed the software, had phone conferences with Artefactual Systems, tested the online demo for AtoM, talked with colleagues from other institutions who were using the software, and reviewed their online documentation. Both Archivematica and AtoM software were chosen for use in the pilot project.

One initial challenge was to determine how the IT department would install the software on a virtual machine and configure the server. Art Center operates on a Red Hat enterprise system, but Archivematica requires an Ubuntu operating system. After discussions with Artefactual, we determined that the college could use Ubuntu on the virtual machine. This was an important lesson learned through an unexpected procedural obstacle that we were able to resolve by working closely with the college IT department and learning about details of the software installation requirements.

In late 2013, archives and IT staff worked onsite in Pasadena with consultants from Artefactual Systems, Inc. to install a development version of Archivematica 1.0 and AtoM 1.3.1 on a virtual machine, which has 4 2-GHz CPUs, 8 GB RAM, and 200 GB local storage. Once the installation was complete, consultants trained archives staff on the software, including reviewing the features, settings and configurations, and workflow options.

In early 2014, a production version of Archivematica 1.0 and AtoM 2.0 were installed remotely. Once the software was successfully installed, and the archives had a sample collection digitized, testing began on both Archivematica and AtoM.

Archivematica is designed around the idea of the OAIS model. The software manages digital records from submission into the archives to dissemination as an access tool. Below are three figures which show screenshots of the process.

Figure 2 shows the steps taken when files are initially transferred into Archivematica. The transfer consisted of three images from the Environmental Design department, but

the system can run many more at one time. The list of micro-services refer to the suite of open-source software the files were processed through, including virus scanning, verifying checksums to the files and assigning UUID numbers to the entire transfer. At the top, is the option to create a SIP from these files.

Figure 3 shows the creation of the Submission Information Package (SIP). The first step with the SIP is the option to normalize the files. Figure 4 shows the SIP screen after normalization was approved. At this step, the Archival Information Package (AIP) was created for long-term storage which includes all of the files including preservation and technical metadata. A separate Dissemination Information Package (DIP) is created containing access copies with related metadata which can be uploaded to a collection management and access system.

Archivematica provides the archivist with a number of options while processing digital files. For example, there are several decisions when going through normalization, which is the process to create preservation or access format files. Digital files are usually accessioned into the archives in a variety of formats, and are not necessarily

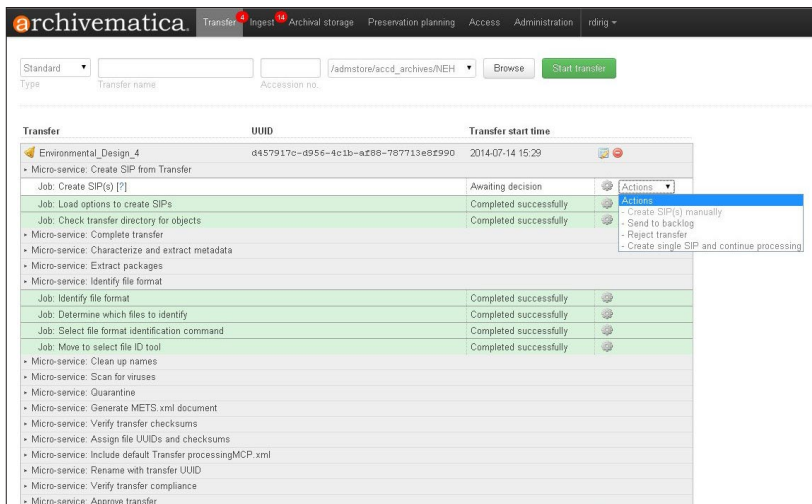


Figure 2: Initial steps in the transfer processing using Archivematica.

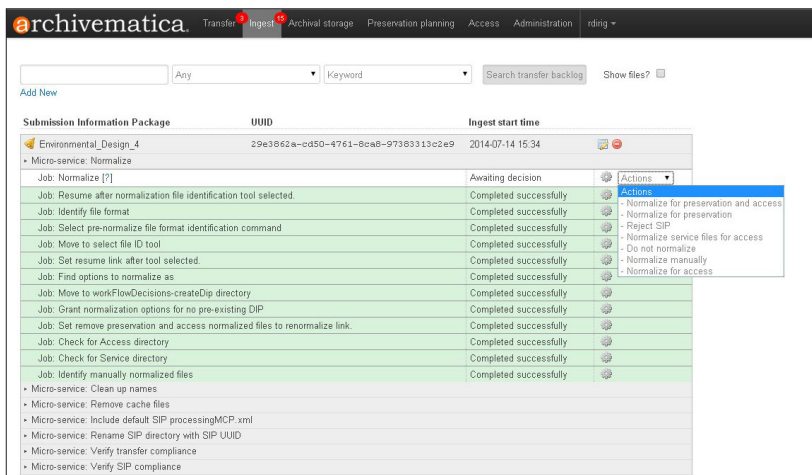


Figure 3: Creation of the Submission Information Package (SIP) in Archivematica.

Submission Information Package	UUID	Ingest start time
Environmental_Design_4	29e3862a-cd50-4761-8ca8-97383313c2e9	2014-07-14 15:34
• Micro-service: Store AIP		
Job: Store AIP (review) [?]	Awaiting decision	Actions
Job: Move to the store AIP approval directory	Completed successfully	Actions
• Micro-service: Prepare AIP		
• Micro-service: Upload DIP		
Job: Upload DIP	Awaiting decision	Actions
• Micro-service: Prepare DIP		
• Micro-service: Process metadata directory		
• Micro-service: Process submission documentation		
• Micro-service: Normalize		
Job: Load finished with manual normalized link	Completed successfully	
Job: Check for manual normalized files	Completed successfully	
Job: Set file permissions	Completed successfully	
Job: Move to processing directory	Completed successfully	
Job: Set resume link after handling any manual normalized files	Completed successfully	
Job: Load post approve normalization link	Completed successfully	
Job: Approve normalization [?]	Completed successfully	
Job: Move to approve normalization directory	Completed successfully	
Job: Remove files without linking information (failed normalization artifacts etc.)	Completed successfully	
Job: Set file permissions	Completed successfully	
Job: Normalize for preservation	Completed successfully	
Job: Normalize for access	Completed successfully	
Job: Normalize for thumbnails	Completed successfully	
Job: Create thumbnails directory	Completed successfully	
Job: Create DIP directory	Completed successfully	
Job: Move to processing directory	Completed successfully	
Job: Normalize [?]	Completed successfully	
Job: Resume after normalization file identification tool selected	Completed successfully	
Job: Identify file format	Completed successfully	
Job: Select pre-normalize file format identification command	Completed successfully	
Job: Move to select file ID tool	Completed successfully	

Figure 4: SIP screen in Archivematica after normalization has been approved.

the ones best suited for long-term preservation storage or for easy access. Archivematica creates several options to guide the archivists through the process. There are default formats for preservation and access, but the preservation planning tab in Archivematica allows users to specify which file format should be used in the normalization process.

The Archival Information Package (AIP) is intended for long-term storage and preservation. The files live on the network storage, and the package, which contains: the original, normalized, and thumbnail files, PREMIS (Preservation Metadata: Imple-

mentation Strategies) metadata, and logs about the transfer process (e.g., normalization and virus checking). PREMIS is the preservation metadata for the objects that ensures long-term sustainability.

After we conducted several tests with our sample collection of digitized materials, our ideas about how to implement Archivematica changed. Initially, we focused on digitized analog materials, which were processed through Archivematica and all of the various micro-services. This process, in the context of a single pilot project, was appropriate, and allowed us to test different file formats, run virus checks, create standard metadata, and normalize the files. This was a safe way to learn the software because the files were created and digitized, and already normalized by the archives.

However, after the test phase of Archivematica we decided that the backlog and incoming born-digital materials would be best suited for future management through Archivematica. Most of the born-digital backlog consists of single copies, in a variety of file formats, and were often stored on fragile media. The risk of permanently losing the born-digital files is greater than the digitized materials, where the original analog copy still exists.

The process of testing and implementing AtoM created a fundamental shift from managing a local database to a public one. Many of our planning conversations about access centered on public versus private space, cataloging, searching and browsing, and the ethics of intellectual property issues.

AtoM is designed to allow archivists to create records in a hierarchical manner, reflective of traditional archival arrangement. With each new record, or archival description,

archivists enter the level of description (e.g., fonds, collection, series, folder, item) and create parent/child relationships.

Prior to AtoM, we would relate collections under a common record group number, but the relationship was not always obvious. While planning AtoM we decided to create fonds-levels for each broad collection. For example, there is now a Product Design Department fonds that encompasses collections from that department as well as item-level images and videotape that were created by that department. Figure 5 shows

a Product Design collection-level description. On the left-hand side of the screen, is the hierarchical structure for the collection, with the fonds above it, and the collection series below.

One important test for the pilot project was the importing and access of digital objects into AtoM. Digital objects can be imported either through Archivematica (as the final step in the DIP), or directly in AtoM. For the test, we tried both methods with successful results. Figure 6 shows a browsing view of digital images imported into AtoM.

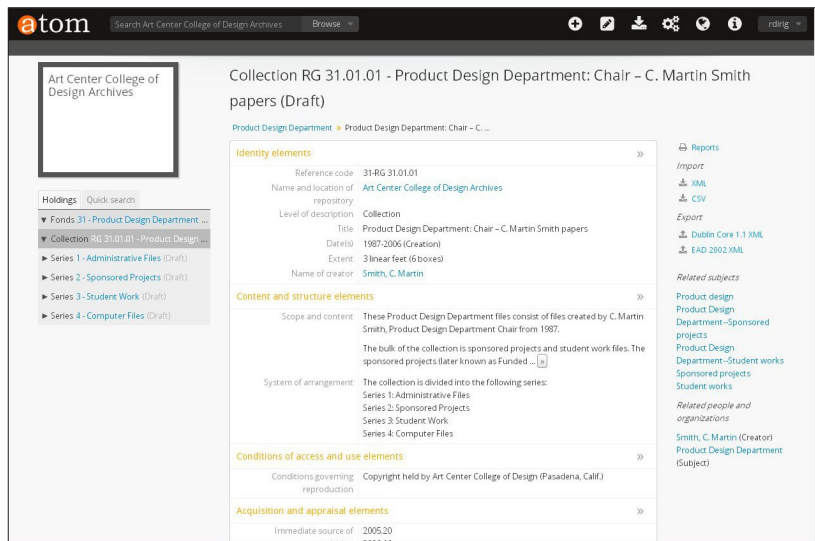


Figure 5: Collection-level description in AtoM.

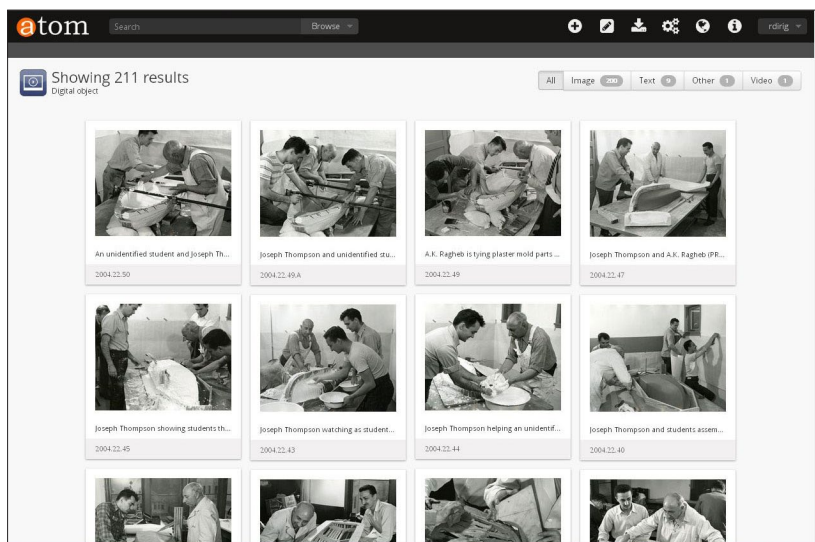


Figure 6: Digital Images browsing results in AtoM.

Some digitized images for the pilot project were already cataloged in our database, so one challenge was to determine how to migrate the metadata. AtoM provides a number of metadata templates, so first we had to determine which one to use, and tested both Dublin Core and Describing Archives: A Content Standard (DACS). Though Dublin Core is quite versatile, it was also less detailed to what we needed to catalog. DACS is primarily used for archival finding aids, but we found it to be useful at the item level too. We created a metadata cross-walk and mapped the Past Perfect fields to DACS fields, for different types of materials (since Past Perfect uses different metadata for archival collections, photographs, and

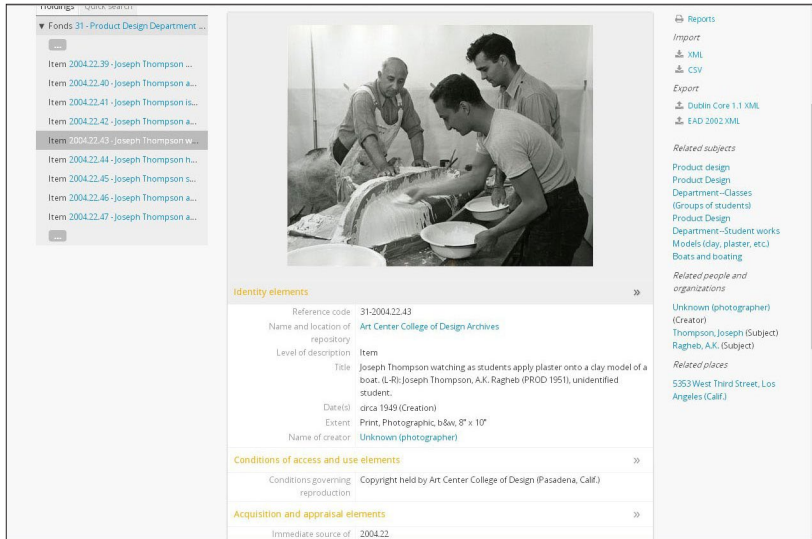


Figure 7: Archival description for item-level photograph in AtoM.

publications). Figure 7 shows an archival description for one of the image records. We chose to consider various users' perspectives on the data when importing data into fields. This was critical since it will be made public. As a result, we tried many different types of searches and browsing options, and sometimes had to change the cataloging method.

This detailed trial and error had to be determined in relation to how AtoM handles data. Trying different searches was crucial to determining how to map the metadata. For

example, at a Fonds level for the Product Design Department collection, an administrative history was written that included a list of department chairs. When "Product Design Department" was included as a creator in subsequent records, a search for a Chair's name would retrieve those records, even though that person might not be a subject of that actual record.

Another test we performed was the search capability of PDF documents. When we digitized the Art Center publications for the pilot project, we processed the files through Optical Character Recognition (OCR), which allows the document to be searched. Upon testing, a global keyword search in AtoM retrieved text from imported PDF documents. This retrieval approach was advantageous for searching the collections. If a researcher is searching for a faculty name, AtoM will retrieve records for any images or collections cataloged with their name, but also anything printed in a magazine or catalog.

Policies and Procedures

Throughout the project, we developed policies and procedures for implementing longer term changes that support research. The project enabled us to rethink and improve upon on existing policies, cataloging procedures and preservation strategies.

During the project, we transformed our access policies. The archives access policy had focused on physical access to the collections and mainly addressed restrictions for specific collections, such as with the President's Office and Board of Trustees records. We are currently revising and adding to the policy to include information on digital web access, primarily in relation to the AtoM database.

The ethics of intellectual property arose as a critical issue in policy formation. For example, the College owns copyright for the historic materials in the collection. However, there are intellectual property issues with images of student work and images taken by specific photographers. Some of the topics to be addressed in the policy revision include: the different levels of access for Art Center students, staff, faculty, general public and a policy statement regarding digital access to student work.

Changes to our accessioning and cataloguing protocols were also necessary. Prior to this project, the archives collected digital materials in three ways: 1) Media receptacles (e.g., DVDs and hard drives); 2) Transmittal services (e.g., Dropbox, WeTransfer); or the 3) Network server. During the project, we realized that the server option was underutilized given the amount of space dedicated to the shared folder.

This process inspired us to expand network transfer of records by linking to an Archivematica directory folder. We are also testing a backlog feature in Archivematica that allows digital records to be ingested and stored in a holding backlog area for the archivist to review.

A new cataloging manual is currently being written based on AtoM. This will be a field-by-field manual based mainly on DACS 2.0 and local cataloging rules. In addition, there are instructions for navigating and using AtoM. Some functionality, such as managing accession records, has not yet been fully explored by the archives' staff, so the evolving document is still a work-in-progress.

During the second half of the project year, we began to define issues requiring attention for long-term planning. While we were still working with the selected portions of the industrial design collections, it became clear that the software and new procedures would work for the archives as a long-term preservation and access solution. While this was promising and had the support of College leadership, the project slowed down and changed from trying to post 1,000 images and other selected materials online within the year, to stepping back and working with IT and archives staff to address systemic issues before the site can be launched publically.

Some of the issues associated with not publically launching the database within the year were technical while others were policy related. In network services, the application currently runs on a college local server, since it was set up as a pilot project. The archives is still working with IT staff to move it to a server that is accessible to the public.

AtoM has many features to create users and groups, restrict collections, and make it available without a login. We want to expand broader access to the database, so we are working with IT to determine different types of users and login options for people both on and off campus.

A final technical issue is with the time-consuming task of migrating data from Past Perfect to AtoM. An assumption was made by the archivists that this step would be far easier than it is, and involves quite a bit of data clean-up.

However, the technical and policy issues are manageable and it remains an attainable goal to launch the AtoM Website to the Art Center community for evaluation by Fall 2014, and to open this database to the public by Spring 2015.

Dissemination and Access

Dissemination of project outcomes will take place using multiple mechanisms. Dissemination strategies employed during the project include: online finding aids, social media (blogs, Facebook, and sharing links), and community outreach. These strategies strengthen our archival practices, and, also inform researchers of the historical assets available to the public at Art Center's archives.

The archives collections are a hybrid mix of both digital and analog materials. Not everything in the archives will be digitized and made available online, but carefully selected portions can be preserved and safely published online.

The internal launch of AtoM began during the summer 2014. The archives worked with Art Center's marketing and communications department and relevant academic departments to promote the archive to the public. The marketing communication team relies heavily on archival collections to share the history of the college. In addition, campus writers constantly generate new valuable content about design and arts education, innovation and change.

In addition, working with faculty and department chairs from our academic programs allowed us to engage faculty and students with the archival collections. This project strengthened our relationships with industrial design departments, increased awareness of the collections, and ensures that new work will be documented and sent to the archives for cataloguing.

Our dissemination methods included new finding aids with the James Lemont Fogg Memorial Library and the Online Archive of California. We also used social media to increase access and awareness. We also used more conventional means to promote the work including publication, attending special events, and panel discussions.

Title Product Design Department Chair : C. Martin Smith papers, 1987-2006.		
Publication Info. 1987-2006.		
Location	Call No.	Status
HC Archives	ARCHIVES (RG 31.01.01)	LIB USE ONLY
Permalink for this record		
Description	3 linear feet (6 boxes)	
Note	The collection is divided into the following series: Series 1: Administrative Files; Series 2: Sponsored Projects; Series 3: Student Work; Series 4: Computer Files	
Summary	Product design was first taught at Art Center in the 1950s within the Industrial Design curriculum. It became a separate department in 1991. These Product Design Department files consist of files created by C. Martin Smith, Product Design Department Chair from 1987. The bulk of the collection is sponsored projects and student work files. The sponsored projects (later known as Funded Educational Projects) files document product design projects from 1994 to 2003. The student work files contain samples of sketches, product ideas and class projects. There are a few administrative files, consisting mainly of lists of students in product design classes. The computer files (almost all of which are on compact disc) are mainly those created by students to support their class work and sponsored projects. There are many photographs, slides, and transparencies which have been removed to the photograph files. Most are slides of sponsored projects and student work. The videotape cassettes (which have been individually cataloged in Past Perfect) have also been removed from the collection.	
Indexes	Finding aid available in the Art Center archives, folder level control.	
Access	No restrictions. Collection is open for research by appointment.	
Cite As:	Cite as: Illustration Product Design Department Chair : C. Martin Smith papers (RG 31.01.01). Art Center College of Design Archives. Pasadena, California.	
Subject	Smith, Charles Martin. Art Center College of Design (Pasadena, Calif.) Art Center College of Design (Pasadena, Calif.) Product Design Dept. Student work.	
Added Author	Art Center College of Design (Pasadena, Calif.). College Archives.	

Figure 8: James Lemont Fogg Memorial Library catalog record for archives collection

The screenshot shows the OAC website interface. The top navigation bar includes links for Home, Browse Institutions, Browse Collections, Browse Map, About OAC, and Help. The main content area displays the finding aid for the 'Product Design Department: Chair - C. Martin Smith papers'. Key details include the collection number 'RG 31.01.01' and a note that there are 'No online items'. The 'Description' section provides a detailed overview of the collection's contents, including administrative files, sponsored projects, student work, and various media like sketches, photographs, and videotapes. The 'Extent' is listed as '3 linear feet (6 boxes)'. The 'Restrictions' section states that the collection is open for research by appointment.

Figure 9: Art Center Archives finding aid in the Online Archive of California.

Finding Aids

Art Center's archives is a program of the James Lemont Fogg Memorial Library and contributes information to the Library Web site. Librarians also guide researchers to the archival collection. The archives works with librarians to catalog archival finding aids, and we promote the archival collections in publications on the library's online catalog. During the project year, new records were added related to industrial design. Figure 8 shows an example of a new record for the Product Design Department collection.

The Online Archive of California (OAC) is a web resource with archival descriptions from over 200 diverse institutions. Art Center contributed new information to the OAC during this project that provided finding aids for the industrial design collections.

OAC is an excellent resource for researchers because they can search multiple archival repositories with one search. For example, a search for "industrial design"

retrieves fifty-seven records for collections from a variety of institutions—and this now includes the project collection from Art Center. Figure 9 shows a screenshot for a finding aid guiding researchers to the Product Design Department collection.

Social Media and Outreach

A project blog was created which contains highlighted information and images that were digitized through the project. The process blog allowed us to keep people informed about the project and share recently scanned images. The blog posts helped us keep the advisory committee updated on the project process and attracted new users (<http://blogs.artcenter.edu/accdarchives/>)

The Archives has been using social media to do outreach and promote the collections. We maintain an Art Center Archives Facebook page. We have also been collaborat-

ing with the marketing and communications department to post Throwback Thursday images on the college's main Facebook page, and, also, contribute to the college blog called *The Dotted Line*. See appendix B for examples of these pages.

This project inspired the Archives staff to reach beyond the collections' walls and collaborate with other groups who share our passion for Southern California history. The Archives now participates in *L.A. as Subject*—a local consortium of libraries, archives, and museums that have materials related to the history of Los Angeles.

In October 2013, the Archives participated in the Annual Archives Bazaar at the University of Southern California, and plans on attending again in 2014. The event is free, open to the public, and showcases many Southern California archival collections. The Art Center Archives sponsored a table where we showcased photographs, ephemera, and videos, and introduced participants to the online database.

Publication of this white paper will further expand awareness of the American Innovations project. We aim to present project outcomes in 2015 at the Society of California Archivists or the Society of American Archivists conferences. Finally, we are planning to organize a public round table discussion about the project at Art Center.

CONCLUSION

The *American Innovation* project allowed the Art Center College of Design Archives to rethink and restructure preservation and access at a time when the proliferation of digital records and the internet have changed how history is preserved and shared. The caretakers of our past must remain at the forefront of technological innovation in order to safely preserve and increase access to the irreplaceable elements of American history.

As intended, this pilot project provided a structured opportunity for experimentation and growth where the archives could plan its first digital management system. This project represents a transformative step forward to increase awareness of the history of industrial design in Southern California.

This essay was written for two audiences: archivists and researchers. As a result, the paper included: **1**) an overview of the collection's significance including its historical context and select images, and **2**) a process oriented discussion of the digital management system from team building to digitization, policies and procedures, and dissemination strategies.

The multidisciplinary challenges inherent in this project required that the archives serve as a catalytic convener for a community of librarians, faculty, historians, technologists and peer institutions. The process allowed us to imagine the repository and the

people we serve in new ways since the collections will reside in both physical and online server space.

Completing this project is by no means an end. Instead, there is much work ahead. In the near future, we aim to be able to fully launch a public access site for the collections, to analyze how digital records are maintained in the archives, and complete the document *Trustworthy Repositories: Audit and Certification Criteria and Checklist*.

Unexpectedly, this project will also help us face new challenges for higher education archives that were outside the scope of the original project aims. Growing our digital literacy and capacity will make it easier to better serve the next generation of cutting-edge multi-media graduate students who research and produce works across platforms and in formats—from handmade designs to interactive websites.

The American Innovation project allowed us to bring the past forward with us into the future, preserve fragile memories, and make these artifacts accessible to designers and researchers for ages to come.



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GLOSSARY

Archival Information Package (AIP)

An Information Package, consisting of the Content Information and the associated Preservation Description Information (PDI), which is preserved within an OAIS.

Born-digital

Information created in electronic format

Describing Archives: A Content Standard (DACS)

A standard for creating access tools for all forms of archival materials, including their archival creators and the forms of creator names.

Digital curation

The selection, preservation, maintenance, collection, and archiving of digital assets. Within the scope of digital curation is the processing of establishing and developing long-term repositories of digital assets. Curation includes digital asset collection, search and retrieval, certification of trustworthiness, integrity and reliability of content, semantic and ontological continuity, and data audit tracking.

Digital object

An object composed of a set of bit sequences.

Digital preservation

The active management of digital content over time to ensure ongoing access.

Digitization

The process of transforming analog material into binary electronic (digital) form, especially for storage and use in a computer.

Dissemination Information Package (DIP)

The Information Package, derived from one or more AIPs, received by the Consumer in response to a request to the OAIS.

Fonds

The entire body of records of an organization, family, or individual that have been created and accumulated as the result of an organic process reflecting the functions of the creator.

Industrial Design

Industrial Design (ID) is the professional service of creating and developing concepts and specifications that optimize the function, value and appearance of products and systems for the mutual benefit of both user and manufacturer.

JPEG

A standard (ISO/IEC 10918) that specifies a digital graphic file format that can reproduce a large color space and that can compress the data to minimize the file size.

Open Archival Information System (OAIS)

A high-level model that describes the components and processes necessary for digital archives, including six distinct functional areas: ingest, archival storage, data management, administration, preservation planning, and access.

PREMIS data dictionary

The PREMIS Data Dictionary's scope is restricted to the following digital preservation activities: maintaining viability, renderability, understandability, authenticity and identity. It assumes preservation metadata will be auto-generated as much as possible and that other suitable descriptive, technical and packaging metadata standards will be used in conjunction with PREMIS.

Preservation metadata

Information about an object used to protect the object from harm, injury, deterioration, or destruction.

Red Hat

Red Hat is a leading software company in the business of assembling open source components for the Linux operating system and related programs into a distribution package that can easily be ordered and implemented.

Submission Information Package (SIP)

An Information Package that is delivered by the Producer to the OAIS for use in the construction of one or more AIPs.

Tagged Information File Format (TIFF)

A standard (ISO 12234-2) for storing a raster graphic and metadata that describes the image content and characteristics.

Ubuntu

Ubuntu is an open source Debian-based Linux distribution.

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